

Claims

1. An apparatus for providing a rotational output comprising a rotational output element, a transfer element providing a traversable circuit relative to the rotational output element, a constraint arranged to constrain the transfer element against rotation about its own axis but allow eccentric oscillation of the transfer element, and an input drive, in which the input drive is arranged to cause oscillation of the transfer element and traversal thereof relative to the rotatable output element to provide a rotatable output.
430
2. An apparatus as claimed in claim 1 in which the input drive comprises a rotatable input element arranged for traversal of the traversable circuit relative to the transfer element.
3. An apparatus as claimed in claim 2 in which the transfer element has an inner and outer traversable circuit for respective traversal by one of the input and output elements.
440
4. An apparatus as claimed in claim 2 in which the transfer element has one of a traversable inner or outer circuit and the input and output elements traverse said circuit.
5. An apparatus as claimed in any of claims 2 to 4 and comprising a plurality of input elements.
6. An apparatus as claimed in claim 5 in which first and second input elements are provided sandwiching a portion of the transfer element to traverse respective inner and outer circumferential circuits thereon.
450
7. An apparatus as claimed in claim 1 in which the input drive comprises a varying electromagnetic field drive or piezoelectric drive or fluid impulse drive.

8. An apparatus as claimed in any preceding claim in which the transfer element comprises a variable geometry ring.

460

9. An apparatus as claimed in claim 8 in which the ring is a flexible ring.

10. An apparatus as claimed in claim 9 in which the input drive comprises at least one pair of rotational input elements arranged to traverse an external circumference of the transfer element and disengage a region of the transfer element from the rotational output element in the region between the input elements.

11. An apparatus as claimed in claim 10 in which the input elements are variably spaceable.

470

12. An apparatus as claimed in claim 8 in which the geometry of the ring is variable to vary the circumference of the traversable circuit.

13. An apparatus as claimed in claim 12 in which the ring includes a pair of ring ends moveable relative to one another to vary the circumference.

14. An apparatus as claimed in claim 12 in which the ring is inflatable to vary the circumference.

480

15. An apparatus as claimed in claim 8 in which the ring comprises a deformable portion and oscillation of the transfer element comprises translation of the deformable portion around the circumference of the ring.

16. An apparatus as claimed in any preceding claim further comprising a seal provided between the input drive and the rotatable output element.

17. An apparatus as claimed in claim 16 in which the seal extends across the transfer element.

490

18. An apparatus as claimed in any preceding claim in which the transfer element is decouplable relative to one of the input drive and the rotational output element.
19. An apparatus as claimed in any preceding claim in which the constraint is releasable to allow rotation of the transfer element about its own axis to decouple the transfer element.

500 20. An apparatus as claimed in any preceding claim in which the constraint comprises at least one of a ring, tube, membrane, flexible band, spring, bellows, or magnetic constraint.

21. An apparatus as claimed in any preceding claim further comprising a frictional or positive coupling between any of the input drive, transfer element and output element.
22. An apparatus as claimed in claim 1 in which the transfer element is traversable throughout an inner circumference of a rotational output element.

510 23. An apparatus as claimed in any preceding claim in which the rotational output element comprises a rotating electromagnetic field.

24. An apparatus as claimed in any preceding claim comprising an apparatus for providing a greater than or less than unity ratio between input and output rotational speed, or for coupling a rotational input to a rotational output.

520 25. A transmission, drive, reducer, generator or motor or engine comprising an apparatus as claimed in any preceding claim.

26. A method of providing a rotational output comprising causing traversal of a rotational output element relative to a traversable circuit of a transfer element in which the transfer element is constrained against

rotation about its own axis but can oscillate eccentrically in which an input drive causes oscillation of the transfer element and hence traversal relative to the rotational output element to provide a rotational output.

530

27. An apparatus or method substantially as herein described with reference to the drawings.